Hand Wipe Solvent Replacement Study Assessment

Background:

Hand-wipe cleaning of an aircraft surface with an organic solvent is a step in the surface preparation process designed to remove contaminants such as grease, dirt, oil, aircraft fluids, and uncured sealants and adhesives. Concern for the environment and worker health and safety have led to the establishment of an extensive network of federal, state and local environmental regulations governing chemical usage and affecting hand-wipe cleaning operations. Wipe-solvent chemicals make up approximately 20% of the total combined volatile organic compounds (VOC) and hazardous air pollutants (HAPS) generated at the Air Logistics Centers (ALC) during aircraft refinishing. In response to these evolving regulations and the need to find alternatives for methyl ethyl ketone (MEK) and toluene, a number of USAF-sponsored studies have been performed to identify commercially available hand-wipe solvent products that could be used as drop-in replacements.

Project Sponsor/Customer: Air Force wide
Period of Performance: 1997

Objectives:

The purpose of this project is to technically review and evaluate four previous studies that were designed to find commercially available alternative hand-wipe solvent products. These reports were published between December, 1993 and September 1995. They include two by the Science & Engineering Laboratory at McClellan Air Force Base (December 1993; December 1994), one by Mercer Engineering Research Center (December 1994), and one by Battelle (September 1995). The objective of this project is to assess the completeness of these previous reports, when considered as one body of information, in terms of the substrates tested, products tested, types of tests performed, and test methodologies. Since some of these reports are now several years old, CTIO assessed their relevance in the changing regulatory environment. From the information gained, it is possible to determine the future directions required, if any, to eliminate the usage of MEK and toluene as hand-wipe solvents.

Status:

From the 54 products tested by the four studies, eight wipe solvent alternatives were judged to be acceptable for immediate use. Of the eight products selected, four were passed by the Mercer study, two by the Battelle study, one by the first McClellan study, and two by the second McClellan study. Of these eight products, only DS-108 was selected in at least two studies (McClellan II and Battelle). These products contained a wide range of chemicals and chemical blends including non-aromatic hydrocarbons, terpenes, propylene and dipropylene glycol ethers, and a number of different esters.

In general, the following conclusions and recommendations were made:

1. The body of data is incomplete; more uniform testing should be done.
2. The correlation between the test acceptance criteria and actual performance requirements needs to be clearly defined.
3. An inadequate number of aircraft materials have been tested for compatibility.
4. New and additional solvents and solvent products should be tested.
5. A recently released specification, P-W-2891, Wipe Solvents, Low Vapor Pressure, should be reviewed for its suitability in meeting US Air Force needs.

Final Report: "Hand-Wipe Solvent Replacement Study Assessment"
Date: Sep 97
Author: Charles K. Baker
As of Date: Apr 01
Report Number: AFRL-ML-WP-TR-1999-4152